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EDNA DEAN PROCTOR BRIGDE
(Bridge No. 120/112)
N.H. Route 114, spanning the Contoocook River
Henniker
Merrimack County
New Hampshire

HAER No. NH-31

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Custom House
200 Chestnut Street
Philadelphia, PA 19106

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Location: N.H. Route 114, spanning the Contoocook River, Henniker, Merrimack County, New Hampshire.

USGS Henniker, New Hampshire Quadrangle, 1:24000
UTM Coordinates: 19.270610.4784320

Date of Construction: 1939

Engineer & Builder New Hampshire Highway Department, Concord, New Hampshire

Present Owner: New Hampshire Department of Transportation
Concord, New Hampshire

Present Use: Vehicular and pedestrian bridge

Significance: The Edna Dean Proctor Bridge is a twin span concrete arch bridge which is notable for the high quality of its design and its masonry exterior. The bridge was built to replace a previous stone arch bridge on the site, constructed in 1835 and destroyed in the 1938 hurricane. The proceeds of a trust fund established by native poet Edna Dean Proctor made possible the construction of the new span, reminiscent of its predecessor rather than a typical steel replacement span.

Project Information: The Proctor Bridge was recorded in July 1997 by Lisa Mausolf, Preservation Consultant, for the New Hampshire Department of Transportation (NHDOT). The recordation was undertaken pursuant to a Memorandum of Agreement between the Federal Highway Administration and the New Hampshire State Historic Preservation Officer executed in association with the planned widening of the Proctor Bridge.

Description of the Bridge

The Edna Dean Proctor Bridge (Bridge No. 120/112), built in 1939, is a two-lane, reinforced concrete, twin arch bridge which is faced with cut stone masonry. The design of the bridge relies heavily on that of its predecessor, a twin-arched stone bridge constructed in 1835 and destroyed by the floods that accompanied the hurricane of 1938. The span carries N.H. Rt. 114 over the Contoocook River and provides a physical connection between Henniker village at the north terminus and the road to the town of Weare, to the south. The crossing is significant as the approximate location of the first bridge built in the town of Henniker in 1782.

The present closed spandrel bridge displays a deck arch configuration in which the roadway lies on top of the arches. It is aligned in a north-south direction with a zero degree skew. The Proctor Bridge consists of twin concrete arches, each of which has a clear span length of 52' 8-3/4" and rise of 16'6". The distance from spring line to spring line is 110'. The total length of the bridge is 118'. There are no approach spans. Each of the arches spans the river at a maximum height of approximately 26'. The roadway width is 24' between curbs, with an asphalt wearing surface. There is a single 4' concrete sidewalk on the upstream side with a solid cut stone masonry rail that consists of three courses of granite blocks, 3'3" high and 1' thick.

Both abutments are constructed of mass concrete faced with stone. The north abutment is supported by a new footing constructed in 1939, incorporating the previous footing, on a base of firm earth and logs. The south abutment rests on old concrete and ledge and also incorporates an older footing of undetermined age. On the downstream side there are two angled mass concrete, stone-faced wingwalls which are nearly perpendicular to the span. The longer of the two, over sixty feet long, is that on the south bank. At the southwest corner the stone wall and sidewalk approaching the bridge curve slightly, ending in an aluminum highway railing. The stone wingwall at the northwest corner angles slightly. The riverbanks are covered with rip-rap.

The center pier is constructed of reinforced concrete with stone facing. The pier is six feet wide at its base and has a batter of 1/2:12. The distance from the top of the pier to the bottom of the footing is 38.5 feet. The upstream side of the pier is pointed; the "nose" is intended to help deflect drift and ice. In order to excavate for the mid-river pier engineers utilized an open cofferdam system to divert the stream for the foundation work. Parallel to the span 15" sheet pilings were driven into the river bed an average of 12 feet deep. On the stream bed, there is a concrete invert, 24" thick under the southern half of the bridge and 18" thick under the north half, with the sheet steel cut-off up and down stream 10 feet and below the stream bed.

Drawings indicate that the concrete was poured in arch rings so that the pier and falsework under each span would be symmetrically loaded. Wood for the falsework was to be select spruce or hemlock with caps of dense Douglas Fir or dense Southern Yellow Pine. Stone from the original Proctor Bridge was apparently reused in the construction of the new bridge. Outlining the arches are stone block voussoirs ranging in width from 1' 3 1/8" at the top to 2' 0 1/2" at the base. The stonework of the rail is laid in horizontal courses while the remaining stonework is of random rubble masonry, composed of roughly squared stones of varying sizes.

At construction, a wearing surface of "pre-mix" was poured over the 7 " thick concrete slab. The slope of the roadway was 3" in 12 feet. The reinforced concrete sidewalk slab was poured in sections three feet long except for a two foot long section over each crown. Asbestos packing paper was located between the sections and at all contact surfaces. A lamp standard is located at each of the four corners of the bridge; the present lights were installed about 1990. In recent years, inspection reports have noted light surface spalling on the concrete surfaces with light leaking and a few rust stains on the concrete deck.

The bridge is located in Henniker village which has served as the political and commercial center of the town since the early 19th century. It is located just south of Proctor Square which marks the intersection of Rt. 114 and Main Street/Western Avenue. The bridge is located 0.7 mile south of the intersection of N.H. Rt. 114 and N.H. Rt. 202/9. There is a business block immediately adjacent to the north end of the bridge with a huge ledge outcrop located on the south end, downstream side. To the south of the bridge is the campus of New England College.

A cast iron plaque is located on the northwest end of the bridge reading, "The Site of the First Bridge in Henniker 1780". This is one of fifteen markers erected by the town in 1896. A geodetic survey mark of the Army Corps of Engineers, dating to 1970, is mounted in the sidewalk in the center of the span.

Historical Information

Background

The town of Henniker comprises 44.8 square miles and is located in the central part of the state, seventeen miles west of Concord, the state capital. The most important natural feature within Henniker is the Contoocook River which follows a winding, but generally northeasterly course through Henniker, ultimately reaching the Merrimack River at Fisherville.

A group of proprietors from Londonderry were first granted land at what is now Henniker in 1752. The first settler, Rev. James Scales, built a log cabin in the western part of town in 1760 although he left after just six months. James Peters, the only proprietor to settle in town, also arrived in 1760 and for two years was the only resident of the town. In 1768 Governor John Wentworth granted the town a charter, naming it after his friend, John Henniker, a wealthy London merchant. The first log church was built in 1770 and subsequently burned in 1780. A new meetinghouse was constructed in 1787 and although extensively remodeled, is still in use as the town hall (Childs 1958: 2-4).

The first major road to be laid out transversed the township from Hopkinton to Hillsboro on the south side of the river with another on the north side. (Childs 1958: 3). The first bridge across the Contoocook River was erected in 1782, a little west of the present Proctor Bridge. Prior to this the river was crossed at two fords, one in the eastern part of town known as "The Falls", a mile north of Plumer Cemetery, and the other at the rapids where the leather board factory was later located. Two ferries also serviced the town, one in West Henniker operated by Deacon Ebenezer Harthorn and the other kept by Peter Howe (Childs 1958: 4). The wooden bridge, with an abutment of stone in the middle of the river with additional stone piers at each end, necessitated frequent repairs. Damaged or carried away by ice and high water, the wooden bridge was rebuilt partially or in total in 1790, 1811 and 1818 (Cogswell 1880: 81-82),

In the early years, agriculture dominated the local economy and prosperous farms were located throughout Henniker. By the early 19th century two villages had formed - Mill Village, now West Henniker, and Henniker Village, the present village center. Water power from the Contoocook River powered several sawmills, grist mills and clothing mills which fulled, dyed, sheared and pressed the cloth produced on hand looms in local farmhouses. The town was located on the old stage road to Windsor, Vermont and after 1825 regular tri-weekly stages came through town on the Concord to Keene and Nashua to Claremont routes while teams moved agricultural produce and livestock through the town on the way to Boston markets (Childs 1958: 5-6). From a population of 1,127 in 1790, the population of the town had nearly doubled by 1820 when it reached a peak of 1,900 persons (U.S. Census).

In 1834 the town voted to build a new stone bridge across the Contoocook River, replacing the wooden bridge. The bridge, consisting of two arches, was said to be the first of its kind in the state. One of the arches measured 45 feet in diameter at its base, the other 42 1/2 feet. The width of the bridge was 24 feet (Bicentennial Comm. 1968). It was constructed by William Smith with the assistance of engineer Isaac Flanders of Lowell, Massachusetts. The bridge was completed before November 1835 at a cost of less than $3500 (Cogswell 1880: 248-252). The first railroad reached Henniker in 1850 although service was discontinued when the tracks were pulled up in 1858.

After the Civil War, Henniker, like much of New England, experienced a period of agricultural decline. Younger residents moved westward in search of new opportunities and hilltop farms became unproductive. During the late 19th century farms throughout the town were abandoned and the population of the town declined, standing at just 1,288 in 1870. At about this same time however, small-scale industrial development began to take place in town. In 1866, Gutterson's Mill at the lower dam began manufacturing dry measures, nest boxes and piggins while other local factories manufactured powder kegs, mackerel kits and shoes. The West Henniker paper mill began operating in 1871. A larger shoe shop was constructed in town in 1885, funded by local subscription. The building was leased to the Chase and Chamberlain Company and initially forty people found work in the mill. An addition was made to the mill three years later and at its height, the plant employed more than one hundred workers. Major industries in West Henniker included the Contoocook Valley Paper Mills, as well as various manufacturers of wood products including shingles, clapboards, lumber and wooden ware, a grist mill and a creamery. By the early 20th century there were far fewer farms in the town but those that remained were more productive. Most of the farms that survived turned to dairy production, supplying carloads of milk to Boston and cream to the local creamery for butter. Many of the farms also catered to summer boarders, taking in city folks for several weeks or months each summer (Childs 1958: 8-10).

By the late 19th and early 20th century West Henniker had diminished in importance while Henniker Village experienced a period of growth and prosperity. The Town Hall was extensively renovated in 1887. Six new streets were laid out between 1889 and 1899 and between 1886 and 1902 over sixty new buildings were constructed in the village. The town's first sidewalks were constructed in 1890 and electric lights were first installed in 1895 (Childs 1958: 9). A fire in June 1893 destroyed a portion of the downtown including the southeast corner of Main and Bridge Streets and the east side of Bridge Street down to the bridge, although in time all of this was rebuilt. Railroad service was reintroduced in 1893 and a new passenger station was constructed in 1900, south of the river.

Industrial activity in the village continued to flourish into the 20th century. In 1905 a leatherboard factory was constructed on the east side of the river. It was destroyed by fire in 1916 and again in 1940, but rebuilt. From 1903 to 1930 one of the largest manufacturers of bicycle rims in the country was located in the mill building at the upper falls, on the east side of the river. The factory later housed the Henniker Crutch Company and then, the Henniker Yarn Company (Henniker History Committee 1980: 112, 121-3).

By the 1930s the age of the automobile had left its imprint on the village center. The first automobile owned in Henniker was bought in 1901 and in 1905 the first gravel-surfaced road was built between West Henniker and Henniker Village. North of the stone bridge, on the east side of the road, the old blacksmith shop was altered for a garage and just to the north, Courser's garage later became an automobile dealership (Childs 1958: 10-11; Henniker 1980: 120). On September 22, 1938, the stone arch bridge in the center of the village was destroyed by a hurricane and subsequent floods (Henniker History Comm. 1980: 186).

The 20th century has brought with it various changes to the area around the Proctor Bridge. In 1946 New England College was established in Henniker. Much of the campus is located to the south of the Proctor Bridge while the bridge is a critical pedestrian link to the college buildings on Main Street including the Inn, Preston Hall and Sanborn Hall. As a result of the construction of the Hopkinton-Everett Flood Control Project in the 1960s three of the four major factories on the Contoocook River have been removed (Henniker History Comm. 1980: 195).

The Edna Dean Proctor Connection

Edna Dean Proctor was born in Henniker on September 18, 1827. Beginning in the 1850s, she contributed frequent articles and poems to various national papers. In 1858 she published a volume entitled Life Thoughts, containing excerpts from the sermons of the Rev. Henry Ward Beecher which was widely circulated in the United States and England. Inspired by the events leading up to the Civil War, Miss Proctor increasingly she became known for her patriotic poetry in support of the Union cause. The first volume of her collected poems was published in 1866. In 1893 she wrote the poem "Columbia's Banner", which was in the official program of Columbus Day programs throughout the country. In 1899 Old Home Week was first observed in New Hampshire and Proctor penned the official poem for the event. Edna Dean Proctor died in December 1922 at the age of 95. Although she traveled extensively during her lifetime and resided in Brooklyn, New York and later Framingham, Massachusetts for much of her mature life, her birthplace was apparently never far from her thoughts (Proctor 1925).

In her will Proctor established the John Proctor and family Trust Fund which in addition to funding the construction of a fountain in Proctor Square in Henniker, provided for the repair and, if necessary, the replacement of the stone arch bridge. Over the years when the bridge was damaged by spring freshets, money from the fund was used to repair it. When the bridge was destroyed in 1938, the Proctor trust fund made it possible for the town to obtain a replica of the old bridge. Monies from the Proctor Fund were used to pay the difference in cost between a stone-faced bridge and the conventional steel bridge which would have otherwise been constructed (Bicentennial Comm. 1968).

Construction of the Bridge

The Proctor Bridge stands slightly east of the site of the first bridge built across the Contoocook River in the town of Henniker. The 1835 stone bridge which previously crossed the river at this point, reportedly the first such double arch stone bridge in the state , was destroyed by a hurricane and subsequent floods in September 1938 (Henniker History Comm. 1980: 186). In a special town meeting held January 7, 1939, townspeople voted to reconstruct the stone bridge over the Contoocook River as provided for by the will of Edna Dean Proctor. It was further voted to that the town appropriate such portion of the principal sum and accrued income of the trust fund as may be necessary to defray the town's share of the joint construction by the town and state (Hillsborough Messenger, January 12, 1939).

The new bridge, NH Proj. No. OH-257, was designed by the State Highway Department. Drawings indicate that the bridge was designed by "JHW" (John H. Wells?) in March 1939. Work to replace the stone bridge began in 1939. Divers were used to ascertain the degree of damage incurred by the piers; the central pier was removed with dynamite in January. By February 9th, workmen had "completed work on the middle pier of the bridge for the time being and are busy removing the pier on the south side of the river" (Hillsborough Messenger, February 9, 1939). In March replacement of the abutments began. A huge derrick, 115 feet high with a 75 foot reach, was utilized to lift and place construction elements. The bridge was back in service by mid-1939 (Henniker History Comm. 1980: 187).

History of Reinforced Concrete Arch Bridges

The use of reinforced concrete for bridges first appeared in the late 19th century and soon found great popularity. The structural material combines concrete, which is strong in compression, with steel, which offers tensile strength. Advantages of reinforced concrete bridges included reduced maintenance costs and the fact they were made from locally available materials and could be built by relatively unskilled laborers compared to steel spans (Jackson 1988: 35-37).

The first known concrete bridge built in the United States was built in Prospect Park in Brooklyn, New York in 1871. The first reinforced concrete bridge was constructed in Golden Gate Park in San Francisco in 1889. After the success of the latter, reinforced concrete arch bridges were built in other parks because of their visual similarity to classic stone arch bridges (Barker 1997: 17). The use of deck arches was first popularized in the United States in 1890s by engineers Fritz von Emperger and Edwin Thacher (1840-1920). In the early 20th century Daniel Luten of Michigan was awarded patents for his reinforced concrete deck arches which were built by local contractors throughout the country (Jackson 1988: 35-36). Although initially reinforced concrete bridges were similar in basic form to stone arch bridges, designs gradually became more daring and included variations such as the open spandrel arch and the rainbow arch.

In the early 20th century short span concrete arch bridges and steel framed bridges with stone facings found great popularity in the design of parkway systems and other places where it was advantageous for the bridge to blend with the natural setting. In addition to aesthetic considerations, the concrete and steel allowed for a greater range of arch proportions, including arches with lesser rises, in comparison to those of conventional stone arch construction (Black 1936: 57).

Throughout New Hampshire there are examples of bridges which combine the historic and aesthetic appeal of a stone bridge with the merits of reinforced concrete construction. Elsewhere in the Contoocook Valley, at Hillsborough, a stone-faced rigid frame bridge replaced the stone arch which was destroyed by the flood of 1938. Also completed in 1940 was a stone-faced T-beam bridge in Hanover over Mink Brook (NH Highway Report, 1940). In Milford, the existing stone arch bridge over the Souhegan River was widened in 1931 using a system of stone-faced, arched reinforced concrete girders to give the illusion of a two-span masonry arch bridge (Bridge Building in New Hampshire: 2).

On October 26, 1988, a thematic review of the state's concrete arch bridges was completed by staff members from the New Hampshire Department of Transportation, State Historic Preservation Office and Federal Highways Administration. A total thirty-seven such bridges were evaluated. The committee determined that the Proctor Bridge was built in the "Mature Flourishing Phase" of concrete arch bridge construction in the state, from 1928 to 1939, and was in original condition. By virtue of its stone facing, its structural systems and materials, the bridge was considered "unusual or novel". Having two spans of 52' 8-3/4", the bridge was considered to be of noteworthy length. The bridge was considered to be an excellent example of a widely used type. Of the thirty-seven concrete arch bridges evaluated in the state, only four bridges received a higher rating than the Proctor Bridge while two others received an identical rating.

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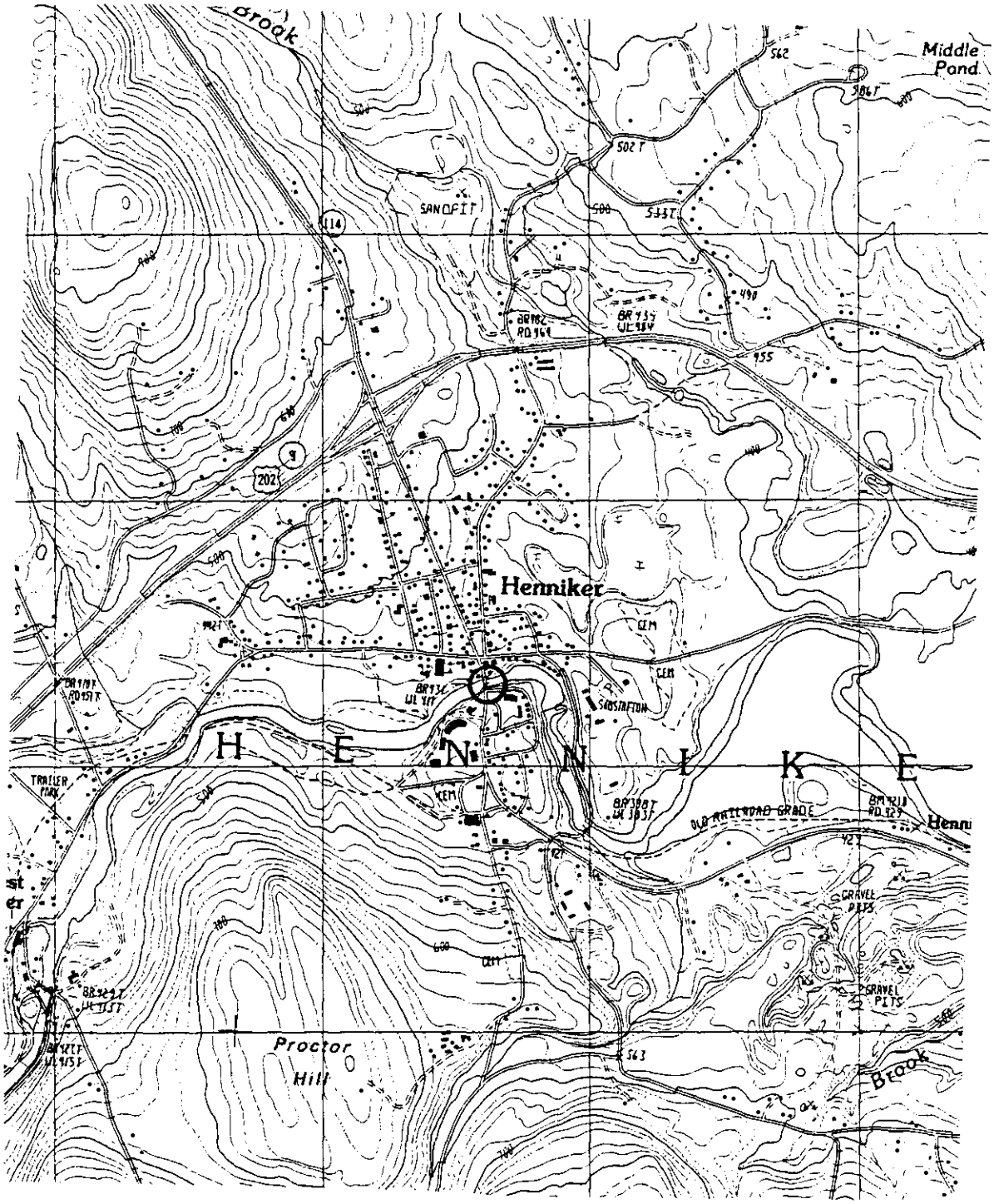
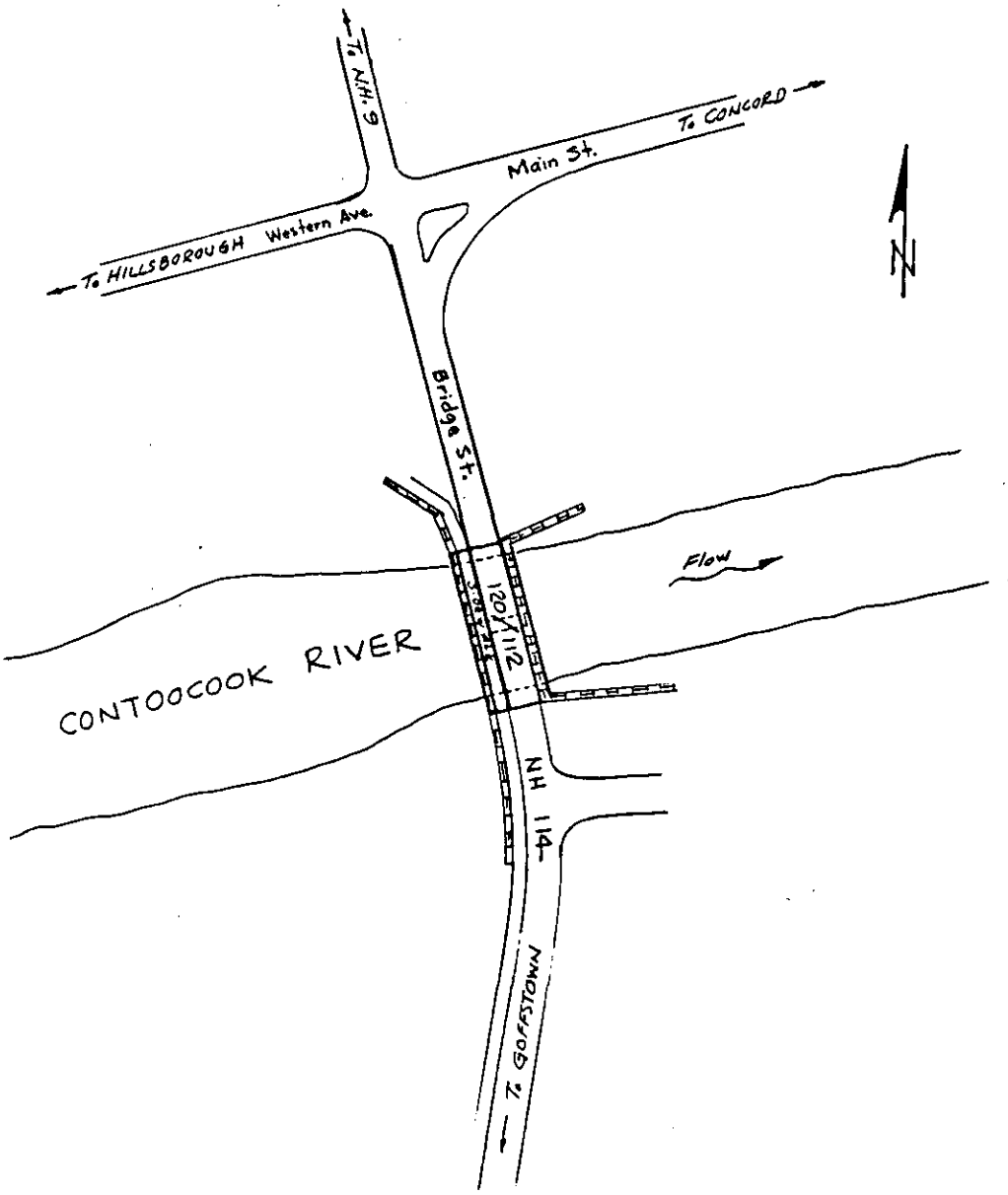


Location Map
Source: USGS Henniker, NH Quadrangle, Scale = 1:24000



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